

FIG.1

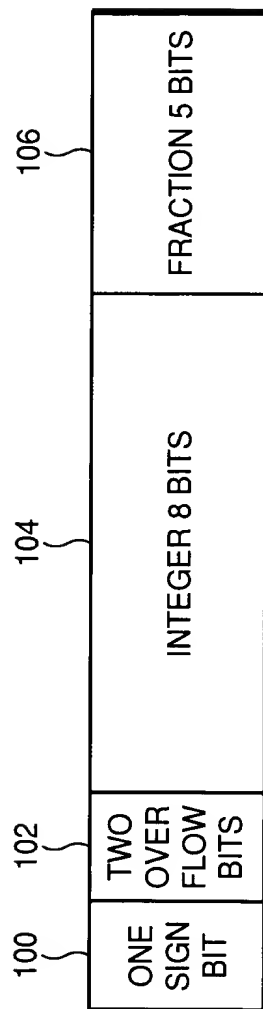


FIG.2A



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Bit 15: Sign bit
Bit 14:p+8: Overflow/underflow bits
Bits p+7:p: Integer part. The integer part may be normalized (0 to 225) or not normalized (-128 to +127)
Bits p-1:0: Fractional part (if p is not zero)

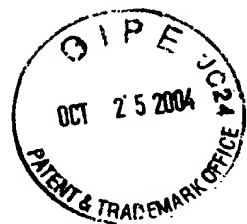
where p is the precision, i.e. number of bits used for the fractional part. P can be zero.

FIG.2B

```
// If input is not normalized, round and add 128.5 to the integer part
// with carry into the overflow and sign bits
If (~InputNormalized) NormalizedInput = input + (257 << p-1)
else NormalizedInput = input

if (NormalizedInput sign bit)
    result == 8'h00
else if (overflow bits)
    result = 8'hFF
else
    result = NormalizedInput[p+7:p]
```

FIG.3

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3F0_002A CSC_M23

Size: 9 bits
Reset Value: 0
Read/Write: R/W
Description: The M23 value
Bit(s) 8: sign
Bit(s) 7:0: magnitude

3F0_002C CSC_M31

Size: 9 bits
Reset Value: 0
Read/Write: R/W
Description: The M31 value (see equations)
Bit(s) 8: sign
Bit(s) 7:0: magnitude

3F0_002E CSC_M32

Size: 9 bits
Reset Value: 0
Read/Write: R/W
Description: The M32 value (see equations)
Bit(s) 8: sign
Bit(s) 7:0: magnitude

3F0_0001 CSC_CONFIG

Size: 4 bits
Reset Value: 0
Read/Write: R/W
Description: Configuration register. Writing to this register also resets the Timeout Occurred status bit.
Bit(s) 2:0: Input precision
Bit(s) 3: Input already normalized

FIG.4A



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3F0_0002**CSC_STATUS**

Size: word
Reset Value: N/A
Read/Write: Read only
Description: Contains status information. Note: Timeout occurred status is reset by writing to the CSC_CONFIG register.

Bit(s) 15: Timeout Occurred
Bit(s) 5: R data ready to be read
Bit(s) 4: G data ready to be read
Bit(s) 3: B data ready to be read
Bit(s) 2: Ca data waiting to be processed
Bit(s) 1: Cb data waiting to be processed
Bit(s) 0: Y data waiting to be processed

3F0_0004**CSC_Ca**

Size: word
Reset Value: 0
Read/Write: R/W
Description: Written as 16-bit normalized or un-normalized value. Read back as 8-bit normalized value. Write is held off until there is space or until a timeout occurs. NOTE: Called Cb in CrCb notation.

3F0_0006**CSC_Cb**

Size: word
Reset Value: 0
Read/Write: R/W
Description: Written as 16-bit normalized or un-normalized value. Read back as 8-bit normalized value. Note: Called Cr in CrCb notation.

3F0_0008**CSC_Y**

Size: word
Reset Value: 0
Read/Write: R/W
Description: Written as 16-bit normalized or un-normalized value. Read back as 8-bit normalized value.

3F0_000A**CSC_AR**

Size: word
Reset Value: 0
Read/Write: Ready only
Description: Zero byte and R result value. Read is held off until valid data is available or until a timeout occurs.

Bit(s) 15:8: 0
Bit(s) 7:0: R value

FIG.4B



Replacement Sheet

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3F0_000C CSC_GB
Size: word
Reset Value: 0
Read/Write: Read only
Description: G and B results
 Bit(s) 15:8: G
 Bit(s) 7:0: B

3F0_0020 CSC_M11
Size: 9 bits
Reset Value: 0
Read/Write: R/W
Description: The M11 value (see equations)
 Bit(s) 8: sign
 Bit(s) 7:0: magnitude

3F0_0022 CSC_M12
Size: 9 bits
Reset Value: 0
Read/Write: R/W
Description: The M12 value
 Bit(s) 8: sign
 Bit(s) 7:0: magnitude

3F0_0024 CSC_M13
Size: 9 bits
Reset Value: 0
Read/Write: R/W
Description: The M13 value
 Bit(s) 8: sign
 Bit(s) 7:0: magnitude

3F0_0026 CSC_M21
Size: 9 bits
Reset Value: 0
Read/Write: R/W
Description: The M21 value (see equations)
 Bit(s) 8: sign
 Bit(s) 7:0: magnitude

3F0_0028 CSC_M22
Size: 9
Reset Value: 0
Read/Write: R/W
Description: The M22 value (see equations)
 Bit(s) 8: sign
 Bit(s) 7:0: magnitude

FIG.4C



Replacement Sheet

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3F0_0030	CSC_M33 Size: 9 bits Reset Value: 0 Read/Write: R/W Description: The M33 value (see equations)
3F0_0033	CSC_SSR Size: 1 bit Reset Value: 0 Read/Write: R/W Description: Sign of Sr
3F0_0034	CSC_SR Size: word Reset Value: 0 Read/Write: R/W Description: Sr value (see equations)
3F0_0037	CSC_SSG Size: 1 bit Reset Value: 0 Read/Write: R/W Description: Sign of Sg
3F0_0038	CSC_SG Size: word Reset Value: 0 Read/Write: R/W Description: Sg value (see equations)
3F0_003B	CSC_SSB Size: 1 bit Reset Value: 0 Read/Write: R/W Description: Sign of Sb
3F0_003C	CSC_SB Size: word Reset Value: 0 Read/Write: R/W Description: Sb value (see equations)
3F0_003F	CSC_MTXP Size: 3 bits Reset Value: 0 Read/Write: R/W Description: Matrix precision value used to determine amount of final shift (see equations)

FIG.4D



Programming Setup

Write CSC_CONFIG precision value and normalized flag.

Write CSC_Mxx values

Write CSC_Sx sign and magnitude values

Write CSC_MTXP matrix precision value

Computation No Pipelining

1. Write Ca value
2. Write Cb value
3. Write Y value (NOTE: always write Y last)
4. Read AR value
5. Read GB value (NOTE: always read GB value last)
6. Write next Y value or CaCbY values
7. Read AR and GB
8.

Pipelining

Pipelining will give about 20% improved performance. This requires always keeping one CaCbY value ahead of the ARGB reads as follows:

1. Write Ca value
2. Write Cb value
3. Write Y value (NOTE: always write Y last)
4. Write second CaCbY, or Y-only values
5. Read AR and GB (NOTE: always read GB value last)
6. Write CaCbY or Y-only values
7. Read AR and GB
8.
9. Read last AR and GB values

FIG.5